Starship Kit - Volume 6.1

- Engines, Propulsion & Power -

1 ABC 2 DEF 3 GHI

4 JKL 5 MNO 6 PQR

7 STU 8 VWX 9 YZ

0 START

Ennead Games

Preface

Starship Kit 6.1
Ship Systems
Engines, Propulsion & Power

Ships need to go, to move through space. Virtually all of them need power as well. Those core parts of almost all space going vessels are covered here.

This is part 6.1 of the Starship Kit, although it can be used as a standalone product if required.

Future parts will include:

- Captain & Crew
- Special Features
- Cargo, both Legal and Illegal
- Ship Quirks

You do not need to have all the parts in the kit to use them, but it does help and is recommended.

This generator/kit is designed to provide the starting points for your own inspiration. Actual details about each system, such as its design or how it actually works is up to you.

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Contents

Ship Systems

How to Use

Class

A broad category, this gives an overall indicator of how strong, powerful and complex the system is. As with weapons, this can vary from group to group, but all other things being equal a Mark V system will be better than a Mark IV but worse than a Mark VI etc.

Not every ship will have all of these systems, but the core systems will exist in some form on almost every ship. The core systems are:

- Computing
- Engines
- Life Support
- Navigation
- Power Generation

The only real exception this is life support for drone or autonomous ships.

The secondary systems include everything else, except weapons, armor and shields, as they have been covered by other parts of the SSK.

Class

Roll a d20. That becomes the tier class of the system you are rolling for. If a 20 is rolled then the system is a Capital-class system and can only be placed on Capital class vessels. Alternately, it is just a Mark XX system, with XX determined by the result of the die roll.

Alternately, if you require a more "realistic" system that keeps the higher class systems to a minimum, use the chart below.

D100	Mark
01	Mark I
02 - 03	Mark II
04 - 06	Mark III
07 - 10	Mark IV
11 - 14	Mark V
15 - 19	Mark VI
21 - 25	Mark VII
26 - 30	Mark VIII
31 – 40	Mark IX
41- 50	Mark X
51 - 60	Mark XI
61 - 70	Mark XII
71 - 75	Mark XIII
76 - 80	Mark XIV
81 - 85	Mark XV
86 - 90	Mark XVI
91 - 94	Mark XVII
95 - 97	Mark XVIII
98 - 99	Mark XIX
00	Mark XX/Capital Class

Quite often, the mark is left off when crew talk about the system, unless there is more than one on the ship and clarification is needed. However, it is useful to know what the tier of a system is as it can have an impact on other systems and the ships size.

Core Systems

All ships have at least:

- A computer system for control
- Engines or some kind of propulsion system
- Life Support
- Navigation
- Power

The only real exception is for Life Support – Drones and other autonomous ships that require no traditional life-support would not be burdened by this extra support system, unless their mission directives are to capture or transport living organisms.

Engines

Engines come in one of two broad categories: Sub-light and FTL, or Faster Than Light. Virtually every space faring culture develops SL before FTL. A working FTL system opens up the universe for the culture, with all the wonders and terrors this brings with it.

Sub light engines, even though strictly speaking many of them are not really engines, do not take a lot of power and it is a rare ship that doesn't have at least one SL system. One major problem with SL drives, apart from the face that they are extremely slow when compared to FTL, is an effect called Time Dilation.

To keep things simple, this is an effect that occurs when travelling at very fast, but still sub-light, speeds. Time slows down for the person traveling, while time passes at the same rate for someone on Earth. So, depending on the SL speed you are going at, a month for the crew of your ship may be 1 year for those at home.

For ships with FTL capabilities, roll/pick from both the FTL table and the SL table.

Sub-Light

D20	SL engine/propulsion
1	Beam Rider
2 – 4	Fusion
5 – 7	Ion Drive
8	Magnetic Sail
9	Nuclear Pulse
10 – 13	Plasma Engine
14 - 17	Rocket
18 – 19	Slingshot
20	Solar Sails

Beam Rider

A Beam rider is a term used for any propulsion system that user a generator on a planet or create a powerful beam that the ship uses in some way to create thrust, either by hitting a component on the ship that vaporises or by "pushing" against a sail like the wind on a terresital bound vessel.

Fusion

A fusion drive, sometimes called a fusion rocket engine, is the next step up from the rocket engine. It uses less fuel and produces less radiation, if any, when compared to the fission rocket engine. For many ships this is the most typical sub-light propulsion system used and higher class models can achieve a respectable percentage of light-speed.

Ion Drive

An ion drive is one that creates thrust by generating and expelling ions. They are quite efficient engines, but not designed for high speeds as they have a low acceleration rate.

Magnetic Sail

A variation on the solar sail, the Magnetic sail uses the solar wind (or an artificial equivalent) instead of light to propel the ship.

Nuclear Pulse

A nuclear pulse propulsion system works by causing controlled nuclear explosions and using the resulting forces to push the ship in the direction desired. There are many variations on this method, with some having the explosions occur inside the ship and others outside the ship. Each method has its own drawback and benefits.

One major problem with this method is that the radiation level in the areas where the explosions occur can get very high, making the need for radiation protection for the rest of the ship a high priority.

Plasma Engine

A plasma propulsion engine is a type of propulsion that generates thrust from plasma, which is a super-heated gas.

Rocket

This is the first type of propulsion virtually all cultures develop. A fuel of some kind is burned or used and the resulting output is used to push the spacecraft forward. They require a lot of fuel and are very energy intensive. Often the rockets are used to provide the initial thrust and to slow down, with minor course corrections along the way.

With careful planning, the fuel and efficiency can be increased by using the gravity of stellar bodies, such as planets to help provide a speed change and an alteration of the direction of travel.

Slingshot

A sling shot system is even simpler than rockets. It's a fire-and-forget. If the initial calculations are wrong by even the smallest amount, the target could be missed by many thousands of miles. However it does have one major advantage in that it requires almost no fuel to use.

Solar Sails

The solar sail, sometimes called a light or photon sail that uses radiation (also called solar) pressure to push large, ultra-thin reflective surfaces. These mirror-like sails then in turn pull the ship they are attached to. It is a very slow, low thrust propulsion system. The larger the ship, the larger the sails need to be.

They have several major drawbacks in that they can only work where there is a solar wind of some kind and the sails are quite thin and prone to damage. Also, they have a very small, but steady and constant, acceleration.

A few of these solar sails though, especially those with a high mark rating, are capable of achieving almost 10% the speed of light.

FTL propulsion

Most races use the same type of drive on all their ships, with other drives being reserved for experimental or testing ships, for ease of manufacturing, repair and use, although there may be subtle variations amongst the fleet, they would all work on the same basic principles.

The Mark level of the drive (e.g. A Mark XI Gravity Engine) typically determines the following factors about the drive:

- Amount of fuel used per jump or activation and to maintain it
- Cool down time before being able to be used again
- Complexity
- Ease of use
- Range
- Size of the engine – The higher the mark the smaller it is
- Speed (relative), both theoretical maximum and cruising speed

You can use the same mark level for each aspect of the propulsion or have 1d4 variations for each aspct – So a Mark XII Engine could have be the same size as a Mark X etc.

D100	FTL propulsion
01 - 25	Alcubierre/Warp Drive
26 – 30	Folding Generator
31 – 35	FTL Catapult/Slingshot
36 – 40	Gravity Engine
41 – 65	Hyperspace
66 – 70	Inertia less Propulsion
71 – 80	Jump Drive
81	Quantum Tunnelling
82 - 87	Slipstream
88	Tachyon Drive
89 - 90	Teleportation
91 – 92	Wave Riding
93 – 95	Wormhole
96 - 00	Something Else/Unknown

Alcubierre/Warp Drive

The Alcubierre drive is more famous for being called a Warp Drive. It works on the principle of contract the fabric of space time in front of the ship and expanding it behind the ship. The ship then "rides" the wave pushing it forwards at very high speeds.

Folding Generator

It has been said that the shortest distance between two points is a straight line. The Folding Generator bends those two points together so that the area around them is either overlapping or even touching. The ship then moves at normal speeds and "unfolds" space, having crossed to the other side it has now travelled huge distances in a single activation.

FTL Catapult/Slingshot

Only a few cultures use this type of FTL system, mainly due to the cost of setting up and the fact you either need to slow down the other end or be "caught" be another slingshot at your destination.

As the name suggests, the Slingshot throws the ship at speeds through some kind of exotic accelerator (varies by culture), which pushes the ship to beyond light speed., either through an early form of hyperspace or tunnelling. Another slingshot the other ends "catches" the ship and slows it down to a more manageable speed. One major disadvantage is that the slingshots, once set up, cannot be moved.

One major advantage, and for many is the reason these systems are still in use, is that the ship using the catapult doesn't need its own inbuilt FTL system, but the ship works better if it has been designed for a slingshot propulsion and that's what this type of "engine" represents.

Gravity Engine

A gravity engine is considered by some to be a variation of the warp drive. In fact what this type of engine does is to alter how gravity affects the ship. The fabric of space isn't changed, like in a warp drive, but the effects are very similar.

These types of engines are very complex and can cause problems if they go wrong and it is not recommended to use a damaged one. They can also cause havoc with other FTL engines that are sensitive to gravity.

Hyperspace

Hyperspace is an alternate region of space-time that co-exists with our own. Hyperspace works on the principle that within this swirling energy intense region, distances travelled are longer in real-space. For example 100 miles in hyperspace could equal 10 light years in real-space. You still have to travel the distance required, but hyperspace makes that distance, much, much smaller. Think of it as a short-cut through another dimension.

Getting lost in hyperspace is a real-possibility, so some kind of beacon system is normally established. Go off the path and you never know where in the universe you end up.

There are two main ways of getting to hyperspace – One is through a gate or portal system, the other is the ship shifts itself into hyperspace. The first is easier and in many ways safer, but requires a stationary open portal, the second allows for the ship to enter hyperspace on its own at any point it chooses.

It is highly recommended to never use a hyper drive or establish a hyper gate near sources of high gravity, such as a star. And building one or using one in an atmosphere is simply asking for trouble.

Inertia less Propulsion

Sometimes called reactionless drives, the ILP system works by affecting the mass of the ship it is on. Inertia is the measure of the resistance of a material body to a change in state of motion. This drive removes that resistance. It is this that allows the ship to travel at and beyond the speed of light.

Due to the immense complications with setting up these types of drives they are only used by highly advanced or wealthy cultures.

One major advantage they have is that this ship does not require an additional sub-system to protect those within from the high speed when the ship travels to light speed and beyond.

Jump Drive

A jump drive is designed to make a spaceship go from one point in space to another point, which may be several light years away, in a single instant. They are sometimes mistaken for teleportation drives, due to the instant nature of their use.

Jump drives require a long time to charge up their capacitors for each jump. Each jump must be to a specified set of spatial co-ordinates. If this is calculated wrong or the capacitors are not fully charged, then the ship will end up somewhere it does not mean to be, which can be dangerous and risky.

A few jump drives are known to be rough on those using them. A few cultures get around this by putting their crews in "jump-couches" that help protect against the nauseas and other side effect that come from using these poorly designed jump-drives.

Quantum Tunnelling

Quantum Tunnelling: a quantum mechanical phenomenon where a particle tunnels through a barrier that it classically could not surmount, the barrier in this case being the fabric of space-time.

To put it simply and some would argue incorrectly, you just fire up the QT drive and go, ignoring the limits to speed and anything in your way, because for you, it simply isn't there anymore. Many say that this is not what a QT drive actually is, but at some point in the past the name stuck, much to the annoyance of scientists and engineers alike.

Strictly speaking this effect would only be used at the quantum level of matter. But, like other drives, this system gets around that.

The major disadvantage of a QT drive is that you are flying blind. Calculations are made beforehand knowing the speed of the drive and direction travelled. Then you hope there is nothing in the area when the QT drive is turned off as if there was, the results would be rather messy. Designated areas are reserved for QT-drive ships to arrive in. Venturing into one of these areas is considered a crime by those cultures that use QT drives.

Slipstream

The slipstream drive works by generating a small tunnel or stream that the ship travels along. This tunnel opens before the ship and closes behind it. Anything that matches the speed of the ship that generates this slipstream can travel alongside it.

This tunnel works on a similar principle to hyperspace in that the distance travel within this stream is greater when compared to real-space.

The major disadvantage to slipstreaming is that you have to travel in a perfectly straight line and a disruption to the stream can severally damage the ship.

Tachyon Drive

Once believed to be a purely theoretical particle until the discovery of ftl travel, the tachyon is a particle that exists only at FTL speeds. In fact it requires energy to slow down in much the same way as anything else would need energy to speed up.

A tachyon drive works on the principle that once activated, you don't need energy to speed up, but to slow down and stop. Or to put it in simple terms, starting a TD is easy when compared to stopping one. This is both its major advantage and disadvantage. The faster you are going, the more energy you need to slow down and stop and if you don't have enough you could keep going faster and faster. The upper speed limit of a TD has never been measured for just this reason.

Teleportation

Unlike a jump drive which activates practically instantly, a teleporting drive works by breaking down the material of the ship (and its crew) and transporting them by some kind of projector through another dimension such as subspace or hyperspace where they are reformed at the other end.

This system has several major disadvantages. One is that there must be a transmitter independent of the ship being teleported. Another is that teleportation is not as perfect as certain governments would have you believe. A TP system works better with a sending and a receiving station away from high gravity areas.

The major advantage is that from the point of view of the ship, almost no time passes at all, but the journey, as far as the rest of the universe is concerned takes as long as it takes for all the data to arrive.

Wave Riding

Ships that use a wave riding system to achieve FTL speeds are often nicknamed surfing ships, for a good reason.

These types of ships are often made by cultures that have just started to understand the principles of warp drive but have yet to perfect the system.

They work by a generator at the home destination creating a subspace wave, which is then projected in the rough direction desired. The ship and anything else in the way then "rides the wave"

A few ships have the ability to generate their own wave, as these require a massive amount of power.

Wave Generators that are planetary based are limited in that they can only project a wave in the direction the part of the plant the generator is on is facing. This combined with the fact that the wave dissipates after a certain distance makes them unsuitable for many cultures to use for long trips. Also, once on a wave you cannot get off, so you need to be sure in the calculations made before the projector is used.

Wave generators work best on ships designed for them and other ships that try to use a WG as a means of propulsion have a good chance of being damaged in the process.

Wormhole Generator

Often thought to be a combination of a slip-stream drive and a folding generator, this works by creating a tunnel from one area of space to another. The ship then passes through the wormhole and arrives after a short period of time in another part of the universe.

A wormhole opening can be a fascinating thing to see. The colouration and look of a wormholes entrances and exits varies, but is the same for each culture. One might have a green tinge, another bright white.

Travel through a wormhole is quite dangerous without the proper shielding and even then most forget that wormholes can be two-way and an enemy seeing one opening in their system may have time to prepare to attack you in transit.

Something Else/Unknown

This is a category for any other type of weird and exotic drive system that works under principles that are not known are simply defy conventional understanding.

Use this category to create one-off and weird propulsion system. It could be a ship powered by psionic energy, or the life force on those on board. Another could be so complex that no-one understand how it works, not even those using it.

Power Generation

Ships need power. Even lifeless drone ships need something to power their A.I. circuits.

Low Power Generation

Low Power Generation (LPG) is for the systems on the ship that that, as the name would suggest, do not need a lot of power. LPG for the most part, cannot be used to fire weapons or power shields, not without a major boost in output and re-enforcing the power conduits. Even then, it will either use up all the fuel or possibly destroy the LPG.

Essentially the type of LPG a ship has can be classed as one of several categories.

D10	Low Power
1 – 3	Nuclear (Fusion)
4	Chemical
5 - 9	Plasma
10	Reduced HPG

Nuclear and plasma generators are fairly standard on almost all ships. Resources and development paths decide what is used.

Chemical generators are very simple, from a design point of few. A Chemical reaction of some kind, either from burning or other reaction powers the generators that makes the LP system work.

Reduced HPG is power from the HPG system that has been reduced in voltage to be useable by the low power grid. This can save on space and fuel system needed, but if the HPG system is damaged then all power not in batteries is lost.

High Power Generation

This for systems on the ship that require a lot of power, such as shields or weapons and even the FTL system – assuming the ship has one.

The ships HPG system creates a lot of energy and as such is normally protected quite heavily. This has the added bonus of protecting the crew from any adverse effects the HPG may have. Each also has some kind of ejection or nullification system in case of catastrophic failure or damage.

D100	
01 – 45	Anti-Matter/Matter
46 – 90	Singularity
91 - 95	Advanced Fusion
96 - 00	Zero-point

Anti-Matter/Matter

The reaction between matter and ant-matter produces a rather extreme amount of energy. This energy is siphoned off and used to power the HP grid.

Singularity

Sometimes called a “Black Hole” engine, this system used the power from a trapped artificial singularity

Advanced Fusion

Compared to other system the AF is the weakest of the lot. Often the first type of HPG a culture develops.

Zero-Point Energy

A ZPE generator taps into the power grid of the universe itself. A theoretical limitless power source – Although the components that access this power are rather fragile and need replacing quite often when compared to other system.

Fuel

For simplicity's sake, assume that the fuel the ship has is appropriate for the engines and power systems on board. The mark indicator, if any, shows how much fuel the system has appropriate for the ship.

If the ship has multiple propulsion and power generation systems, then there needs to be a fuel system for each, although some may share the same fuel.

The mark indicates how many weeks of fuel or energy that particular system has, assuming the system runs at standard operating levels and is not damaged in anyway. This is per tank or storage facility.

Batteries

Batteries are used to store excess power when not needed and to provide back-ups if the main generator goes down. Although not always suitable for high-power requirements such as the FTL drive, they can keep a vessel intact in battle or provide a boost to other systems in an emergency.

Batteries have two aspects to them – Size (relative to ship size and class) and nature. The size is a measure of how much power they can hold for their mark – a larger battery may not be able to hold as much power as a smaller and better designed one. The second aspect is the type of battery.

D20	Battery size
1 – 2	Tiny
3 – 6	Small
7 - 14	Medium/Standard
15 – 18	Large
19 – 20	Extra Large

D20	Battery type
1 – 10	Standard
11 – 13	Fast
14 - 16	Slow
17 - 20	Back-up/High Cap

Standard

The standard battery on the ship.

Fast

A fast battery charges quickly, but also drains quickly when not supplied with power.

Slow

A slow battery charges slowly, but when not supplied with power, holds it charge for longer.

Backup/High Cap

These are designed in such a way that they will only discharge their held power once activated. Not suitable for everyday use as they are meant to keep their power reserves for as long as possible.

Each ship has at least one battery, with the majority having more than one, spread throughout the ship for redundancy and safety.

Coming Soon

Keep an eye out for these upcoming products from Ennead Games (in no particular order)

Starship Kit Part 6.2
Medical & Environmental

Your ship is going to need a crew and maybe even take on a passenger or two for their latest mission.

Background & Details Kit
Super Heroes

The Background and Details Kit returns – This time covering Super Heroes, their origins, powers and more

Prison Kit

Sometimes you need a place to hold those dastardly villains. A multi-part kit series that will cover the prison, security and the inmates, their crimes and those who guard them

Spell Generator

For those times you need to create a spell but can't decide just what it does.

Pantheon Kit

A multiple series of generators linked around creating your world's pantheon and gods!

Also Available

Other products from Ennead Games

Background & Details Kits
Fantasy + Scifi

Need some background details for your characters? You can't decide how many children they have or what their hair style is?

Well worry no longer. The BADK is for you. Currently available in two versions, one themed for fantasy characters and the other for sci-fi characters, the BADK will give you enough options and suggestions to get the creative juices flowing for a long time,

Technobabble Generator
(Standard, Extended and Steampunk)

Technobabble is a staple of any sci-fi game or story. It helps with emersion and makes impressive sounding technology.

3 versions of the technobabble generator are available

- Standard – Basic technobabble generator
- Extended – Takes the Standard version and adds more options and solutions for your technological problem
- Steampunk – Technology goes steampunk with this version that adds wonderful devices and the names of those who invented them